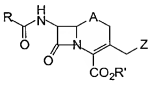
WHAT IS CLAIMED IS:

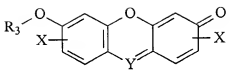
1. A compound having the general formula:



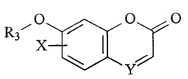
(I)

in which R is a benzyl, 2-thienylmethyl, or cyanomethyl group; R' is selected from the group consisting of H, physiologically acceptable salts or metal, ester groups, ammonium cations, --$CHR_2OCO(CH_2)_nCH_3$, --$CHR_2OCOC(CH_3)_3$, acylthiomethyl, acyloxy-alpha-benzyl, deltabutyrolactonyl, methoxycarbonyloxymethyl, phenyl, methylsulphinylmethyl, β-morpholinoethyl, dialkylaminoethyl, and dialkylaminocarbonyloxymethyl, in which R_2 is selected from the group consisting of H and lower alkyl; A is selected from the group consisting of S, O, SO, SO_2 and CH_2 ; and Z is a donor fluorescent moiety.

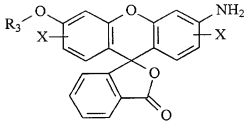
2. The compound of claim 1, wherein the donor fluorescent moiety is selected from the group consisting of:



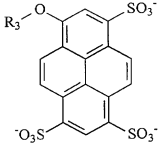
(II)



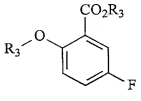
(III)



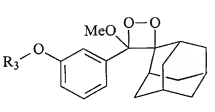
(IV)



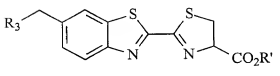
(V)



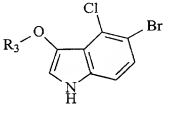
(VI)



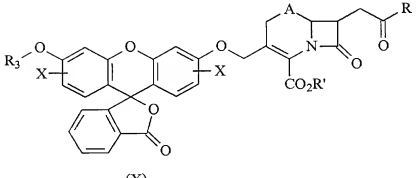
(VII)



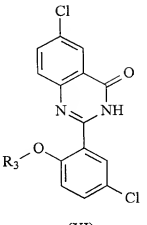
(VIII)



(IX)



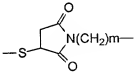
(X)



(XI)

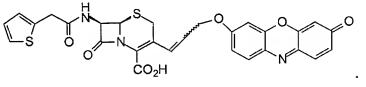
R_3 is a linker for the fluorescent donor.

3. The compound of claim 2, wherein the linker is selected from the group consisting of a direct bond to a heteroatom in the fluorescent moiety, --$O(CH_2)_n$--, --$S(CH_2)_n$--, --$NR_2(CH_2)_n$--, --N^+R_2 $(CH_2)_n$, --$OCONR_2(CH_2)_n$--, --$O_2C(CH_2)_n$--, --$SCSNR_2(CH_2)_n$--, --$SCSO(CH_2)_n$--, --$S(CH_2)_nCONR_2(CH_2)_m$, --$S(CH_2)_nNR_2CO(CH_2)_m$, and

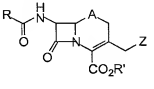


in which R_2, n and m are as previously defined; and m is an integer from 0 to 4.

4. The compound of claim 1, wherein the compound has the structure:



5. A method for detecting the presence of β-lactamase activity in a sample, comprising: contacting the sample with at least one compound of general formula I:



(I)

in which R is a benzyl, 2-thienylmethyl, or cyanomethyl group, or a quencher; R' is selected from the group consisting of H, physiologically acceptable salts or metal, ester groups, ammonium cations, --$CHR_2OCO(CH_2)_nCH_3$, --$CHR_2OCOC(CH_3)_3$, acylthiomethyl, acyloxy-alpha-benzyl, deltabutyrolactonyl, methoxycarbonyloxymethyl, phenyl, methylsulphinylmethyl, β-morpholinoethyl, dialkylaminoethyl, and dialkylaminocarbonyloxymethyl, in which R_2 is selected from the group consisting of H and lower alkyl; A is selected from the group consisting of S, O, SO, SO_2 and CH_2 ; and Z is a donor fluorescent moiety.

6. The method of claim 5, wherein said sample has a β-lactamase reporter gene.

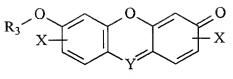
7. The method of claim 6, wherein said β-lactamase reporter gene is in a mammalian cell.

8. The method of claim 5, wherein samples having β-lactamase activity are separated from samples having no β-lactamase activity by fluorescent-activated cell sorting.

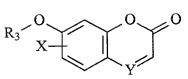
9. The method of claim 5, wherein the β-lactamase activity results from a β-lactamase enzyme that was prepared by mutagenesis of another β-lactamase enzyme.

10. The method of claim 5, wherein said compound is a membrane permeant derivative.

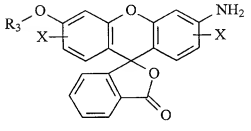
11. The method of claim 5, wherein the donor fluorescent moiety is selected from the group consisting of:



(II)



(III)



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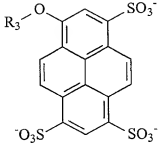
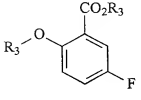
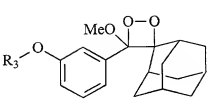


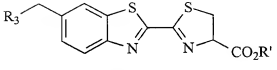
(V)



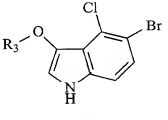
(VI)



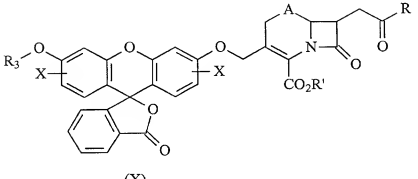
(VII)



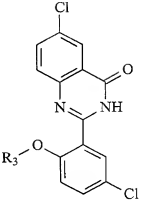
(VIII)



(IX)



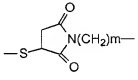
(X)



(XI)

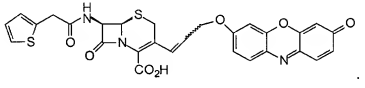
R_3 is a linker for the fluorescent donor.

12. The method of claim 11, wherein the linker is selected from the group consisting of a direct bond to a heteroatom in the fluorescent moiety, --$O(CH_2)_n$--, --$S(CH_2)_n$--, --$NR_2(CH_2)_n$--, --N^+R_2 $(CH_2)_n$, --$OCONR_2(CH_2)_n$--, --$O_2C(CH_2)_n$--, --$SCSNR_2(CH_2)_n$--, --$SCSO(CH_2)_n$--, --$S(CH_2)_nCONR_2(CH_2)_m$, --$S(CH_2)_nNR_2CO(CH_2)_m$, and



in which R_2, n and m are as previously defined; and m is an integer from 0 to 4.

13. The method of claim 5, wherein the compound has the structure:



14. A method for determining whether a compound of claim 1 is a substrate for a β-lactamase enzyme, comprising: contacting said compound with a sample containing said β-lactamase enzyme; exciting at the wavelength for the said compound when cleaved; and measuring fluorescence.

15. The method of claim 14, wherein said compound is a membrane permeant derivative.

16. The method of claim 14, wherein said β-lactamase enzyme has been prepared by mutagenesis of another β-lactamase enzyme.